



## Correlation between normalized difference vegetation index and malaria in a subtropical rain forest undergoing rapid anthropogenic alteration

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### Abstract:

Time-series of coarse-resolution greenness values derived through remote sensing have been used as a surrogate environmental variable to help monitor and predict occurrences of a number of vector-borne and zoonotic diseases, including malaria. Often, relationships between a remotely-sensed index of greenness, e.g. the normalized difference vegetation index (NDVI), and disease occurrence are established using temporal correlation analysis. However, the strength of these correlations can vary depending on type and change of land cover during the period of record as well as inter-annual variations in the climate drivers (precipitation, temperature) that control the NDVI values. In this paper, the correlation between a long (260 months) time-series of monthly disease case rates and NDVI values derived from the Global Inventory Modeling and Mapping Studies (GIMMS) data set were analysed for two departments (administrative units) located in the Atlantic Forest biome of eastern Paraguay. Each of these departments has undergone extensive deforestation during the period of record and our analysis considers the effect on correlation of active versus quiescent periods of case occurrence against a background of changing land cover. Our results show that timeseries data, smoothed using the Fourier Transform tool, showed the best correlation. A moving window analysis suggests that four years is the optimum time frame for correlating these values, and the strength of correlation depends on whether it is an active or a quiescent period. Finally, a spatial analysis of our data shows that areas where land cover has changed, particularly from forest to non-forest, are well correlated with malaria case rates.

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### Resource Description

#### Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

#### Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Temperature

**Temperature:** Fluctuations

# Climate Change and Human Health Literature Portal

## **Geographic Feature:**

resource focuses on specific type of geography

Other Geographical Feature

**Other Geographical Feature :** subtropical rainforest

## **Geographic Location:**

resource focuses on specific location

Non-United States

**Non-United States:** Central/South America

## **Health Impact:**

specification of health effect or disease related to climate change exposure

Infectious Disease

**Infectious Disease:** Vectorborne Disease

**Vectorborne Disease:** Mosquito-borne Disease

**Mosquito-borne Disease:** Malaria

## **Mitigation/Adaptation:**

mitigation or adaptation strategy is a focus of resource

Adaptation

## **Model/Methodology:**

type of model used or methodology development is a focus of resource

Outcome Change Prediction

## **Resource Type:**

format or standard characteristic of resource

Research Article

## **Timescale:**

time period studied

Medium-Term (10-50 years)

## **Vulnerability/Impact Assessment:**

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content